08/876,414

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     (FILE 'USPAT' ENTERED AT 11:30:33 ON 31 OCT 1998)
L1          545 S SEMICONDUCTOR DOP?
L2         3233 S ENERGY PULSE
L3         5151 S LASER PULSE
L4           17 S L1 AND (L2 OR L3)
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7. 5,298,106, Mar. 29, 1994, Method of doping single crystal diamond for electronic devices; Lawrence T. Kabacoff, et al., 117/73, 929; 423/446; 438/105 [IMAGE AVAILABLE]

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9. 5,114,876, May 19, 1992, Selective epitaxy using the gild process; Kurt H. Weiner, 117/53, 58; 148/DIG.105, DIG.106; 438/498, 535 [IMAGE AVAILABLE]

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9. 5,114,876, May 19, 1992, Selective epitaxy using the gild process; Kurt H. Weiner, 117/53, 58; 148/DIG.105, DIG.106; 438/498, 535 [IMAGE AVAILABLE]

US PAT NO: 5,114,876 [IMAGE AVAILABLE] L4: 9 of 17

ABSTRACT:
The present invention comprises a method of selective epitaxy on a semiconductor substrate. The present invention provides a method of selectively forming high quality, thin GeSi layers in a silicon circuit, and a method for fabricating smaller semiconductor chips with a greater yield (more error free chips) at a lower cost. The method comprises forming an upper layer over a substrate, and depositing a reflectivity mask which is then removed over selected sections. Using a laser to melt the unmasked sections of the upper layer, the semiconductor material in the upper layer is heated and diffused into the substrate semiconductor material. By varying the amount of laser radiation, the epitaxial layer is formed to a controlled depth which may be very thin. When cooled, a single crystal epitaxial layer is formed over the patterned substrate. The present invention provides the ability to selectively grow layers of mixed semiconductors over patterned substrates such as a layer of Ge.sub.x Si.sub.1-x grown over silicon. Such a process may be used to manufacture small transistors that have a narrow base, heavy doping, and high gain. The narrowness allows a faster transistor, and the heavy doping reduces the resistance of the narrow layer. The process does not require high temperature annealing; therefore materials such as aluminum can be used. Furthermore, the process may be used to fabricate diodes that have a high reverse breakdown voltage and a low reverse leakage